Silviculture

Introduction

The department relies on the principles of silviculture (the art and science of cultivating a forest) in its day-to-day operations. Objectives developed as part of the landscape level planning process (see Policy No. 16, Landscape Planning, pg. 30) are translated into site-specific actions through the application of silvicultural principles. Through this process, the department controls the establishment, composition, structure and growth of state forests.

The wide range of soil and climatic conditions found in Washington State ensures that no single set of silviculture activities or prescriptions can be applied everywhere. Major activities, such as timber harvesting and reforestation, site preparation, vegetation control, thinning and fertilization, can only be applied successfully when a detailed site evaluation has been completed. The department plans to conduct this evaluation as part of a silvicultural prescription (a plan of action to carry out a series of practices designed to produce a desired result in terms of stand composition and condition). The department seeks to match the most appropriate silvicultural practice with the conditions at a particular site.

The policies listed below will guide the department in making these decisions.

Silviculture Policies

No. 30: Silviculture Activities

▼ **The department will plan and implement silvicultural activities to meet trust responsibilities. In cases warranting special attention, the department will accept a reduction in current income or return on investment when the department determines it is necessary to provide extra protection for soil, water, wildlife, fish habitat and other public resources.**

Discussion

In selecting silvicultural activities, the department will ensure that its actions are consistent with its responsibility as a trustee; it will seek to integrate other objectives, such as watershed and wildlife protection, which have been identified and discussed in this plan.

The department, as trust manager, believes it is legally permissible to preserve future options, particularly as they affect resources that may generate income for future beneficiaries.

In most cases, the Forest Practices Act and regulations provide protection for plants, fish, wildlife, soil and water. Situations do arise, however, where it is in the best interests of the trusts to provide a greater level of protection or to enhance the public resource (for example, fish) in question.

In these special cases, the department will accept a reduction in current income or a lower return on investment to ensure the long-term productivity of trust assets.

No. 31: Harvest and Reforestation Methods

▼ **The department will select the harvest method which produces the best mix of current and long-term income, achieves reforestation objectives and integrates nontimber resource objectives identified in the Forest Resource Plan. Reforestation objectives must ensure adequate restocking, produce acceptable benefits to the trusts and protect public resources.**

Discussion

Harvest and reforestation methods are integral parts of a silvicultural system. The selection of a harvest method is the single most important silvicultural decision the department makes in managing state forest land. It will likely have major impacts on stand structure, stand productivity, water quality and quantity, reforestation, and future management and operational costs. The department must therefore consider many variables before selecting a harvest method that meets these timber and nontimber objectives. Because of the importance of this decision, the department intends to prepare site-specific, silvicultural prescriptions (plans of action). The department intends to use a step-by-step, standardized approach in which information is analyzed for the best, possible alternative.

The department intends to examine thoroughly every proposed harvest unit to select the harvest method which best satisfies the following criteria:

- Meets department responsibilities for generating current and long-term income.
- Meets biological constraints of the site condition.
- Maintains future stand productivity and health.
- Accomplishes the department's objectives for protecting water quality and quantity and fish and wildlife habitat.
- Minimizes impacts on special ecological features and wetlands.

This examination will require a thorough knowledge and understanding of the application of the three basic harvest methods (clearcut, shelterwood and selection), their many variations and the logging systems appropriate to each method. The department anticipates that as a result of this policy, there will be less clearcutting than in the past.

Clearcutting is the removal of the entire stand of trees in one cutting. Once new trees have been established, they grow under full sunlight and are about the same age. In general, the department will not clearcut state forest lands in parcels larger than 100 acres (see Policy No. 32, Green-up of Harvest Units, pg. 48). Another method, shelterwood cutting, is especially suited for reforestation on harsh sites or for certain species that are more tolerant of shade. About 20-40 trees are initially left per acre and are usually removed within ten years. Seed tree cutting involves leaving about 10 trees per acre. It is a useful method in regenerating trees species that are intolerant of shade and where protection from heat or cold are not essential for seedling survival. Selection cutting may be used to develop uneven-aged stands or where aesthetic considerations, wildlife habitat or other land-use factors are primary concerns. Both shelterwood and selection cutting are considered partial-cut methods because some trees are left on the site.

By varying the type of harvest method, the department expects that forest landscapes over time will not look the same as they have in the past. The department believes there are opportunities to employ different harvest methods in both Western and Eastern Washington. Based on the selection criteria and the site-specific analysis called for in this policy, the following trends may occur:

- Shelterwood and selection cutting in those coastal areas with sensitive soils and where the natural regeneration capabilities of hemlock are suited to these methods.
- Clearcuts with reserve trees (see Policy No. 22, Wildlife Habitat, pg. 37) and commercial thinning on those sites in the Southern Puget Sound Trough area where there are deep soils and where brush or other vegetation competes with crop trees for growing space.
- Shelterwood, selection and clearcut methods (with reserve trees) on those slopes of the Cascade Mountains with cool, moist soils and lower site productivity.
- Selection cutting in Eastern Washington on harsh sites with shade-tolerant species and with natural regeneration potential.

The department must consider many variables before selecting a harvest method that meets timber and nontimber objectives.

The department works to ensure that adequate reforestation occurs on state forest land; it accomplishes this objective through a combination of natural regeneration and planting.

Reforestation goes hand-in-hand with the design of the harvest method if stand productivity and health are to be maintained. This part of the site-specific, silvicultural prescription includes site preparation methods, selection of seed trees, seedling stock types, seedling planting practices, seedling protection, control of competing vegetation and proper tree spacing.

The department intends to examine thoroughly every proposed harvest unit for alternatives to prevent over-reliance on reforestation of single species, artificial regeneration and site preparation. The department's goal is the establishment and growth of whichever tree species is best suited to the site, whether hardwood or conifer. The department also intends to minimize the need for all forms of site preparation by careful analysis, planning and selection of reforestation methods. Even with the best planning and execution, however, some sites will still need site preparation. The department intends to select the most appropriate site preparation methods for removing physical and vegetative barriers that interfere with reforestation.

Site preparation methods include burning, herbicide use, hand slashing and tractor (or mechanical) clearing. When choosing a method of site preparation, the department will consider the quantity and type of residue and vegetation, the topography, and the species selected for the site. Soil characteristics, types of water on the site, costs, relevant laws and regulations, and local concerns will also be considered.

The reforestation method selected by the department must:

- Maintain the long-term timber production capability of the site.
- Ensure adequate stocking in a timely manner.
- Protect soil, water, fish, wildlife and aesthetic resources.
- Minimize costs.

All harvest and reforestation prescriptions must meet the department's established financial objectives (Policy No. 12, Annual Review of Financial Assumptions, pg. 25). These plans will be monitored and adjusted as needed. The department will conduct stand surveys and other inventories to ensure proper implementation. In addition, the department will conduct watershed analysis to determine the effects of past, present, and reasonably foreseeable future activities on water quality and quantity (See Policy No. 19, Watershed Analysis, pg. 34.)

No. 32: Green-up of Harvest Units

▼ **The department will reduce the impacts of clearcutting and certain even-aged silvicultural systems by generally limiting the size of harvest areas to a maximum of 100 acres, requiring "green-up" of adjacent areas before harvesting timber and employing other techniques to blend harvested areas into the landscape.**

Discussion

The department recognizes that timber harvest methods can produce significant visual impacts on the landscape. The department intends to reduce these impacts by limiting the size of harvest areas and by controlling and dispersing harvests over time. This policy is commonly called "green-up" because it requires the department to have visible trees, at least four feet high, next to clearcut areas.

This policy is not meant to stand alone. It should be read in conjunction with Policy No. 16, Landscape Planning, which spells out the process by which the goals of the Forest Resource Plan will be translated to specific objectives and activities in the field. In addition, this policy is intended to complement the Wildlife Habitat and Aquatic Systems Policies.

The green-up policy will apply to state forest lands which have been or will be harvested by these even-aged methods: clearcut; seed tree; and final shelterwood removal. (Even-aged harvest methods or silvicultural systems involve cutting most of the trees on a particular site at one time to produce stands that are of the same relative age.) Current policy is to limit the size of these harvest areas to a maximum of 100 acres.

Under the new policy, the department intends to further restrict the size and timing of clearcut areas by prohibiting harvesting within 300 feet of another harvest area if the combined acreage of the areas exceeds 100 acres.

When the average height of trees on a previously harvested unit reaches four feet in height, it is no longer considered a clearcut for the purposes of this policy. This tree-height requirement was selected because it is the point at which new trees are visible from a distance.

Exceptions to this policy include:

- Alternatives which are less environmentally detrimental. For example, if a 120-acre unit can be logged effectively with one road but two new roads would be needed to harvest two 60-acre units at different times, the department may select the larger unit in order to limit overall environmental damage to the site. The green-up requirement would still apply to future timber harvests on adjacent sites.

- Special needs, such as areas which are damaged by fire, insect, disease or windthrow (salvage cutting), or for land exchange agreements.

The selection of harvest methods (see Policy No. 31) will incorporate the size and timing of harvest units described in this policy. The process for selecting the harvest method will also consider other management techniques to reduce visual impacts. These techniques include the shape of the harvest unit, the use of special road design and location, topographic and roadside screening, the use of grass seeding, debris cleanup and specialized logging systems.

No. 33: Control of Competing Vegetation

▼ **To prevent domination of crop trees by other vegetation, the department will select from these methods for controlling competing vegetation:**

1. **No treatment.**
2. **Non-herbicide.**
3. **Ground-applied herbicide.**
4. **Aerial-applied herbicide.**

The department will consider the no treatment method first and then move sequentially down the list. The department will select the first method on the list which is both effective and produces an acceptable return on investment. A method lower on the list may be used only if it substantially outperforms other methods.

Discussion

Even with good efforts at site preparation and regeneration, unwanted vegetation sometimes interferes with the establishment and growth of a new forest. The department's vegetation control program does not seek to eliminate competing vegetation. Rather, it seeks to prevent other vegetation from dominating the crop of trees or severely inhibiting growth in a new stand.

The department uses a variety of mechanical and herbicide techniques during the early stages of forest development. The first step is to determine the need for vegetation control. A survey is conducted on all units that may need treatment to evaluate competitive stress on crop trees. The survey considers density, height and growth potential of both the crop species and competing vegetation. Units are selected for treatment based on current and estimated future competition.

A lower-ranked method on the list will be used only if:

- The higher-ranked method(s) does not meet the effectiveness or return on investment criteria set by the department; and
- The lower-ranked method is substantially superior because of its rate of return or effectiveness; and
- The rate of return and/or effectiveness advantages of the lower-ranked method are not outweighed by likely adverse effects on public water supplies, public health, fish health, fish and wildlife habitat, or the effects on other trees, herbs and shrubs, erosion or applicator safety.

The no treatment option (option 1) will always be considered first.

The most common mechanical method is the manual cutting of competing vegetation (option 2). But the effectiveness of manual control is limited by the ability of many species to resprout and rapidly grow to their original height.

Herbicides will only be used when other methods are not effective or economically justified. In these instances, ground application of herbicides (option 3) will be given preference over aerial application. Ground herbicide application provides more direct control than aerial application.

For some vegetation management objectives, such as controlling resprouting bigleaf maple stumps, ground herbicide application is the most effective choice.

Aerial application (option 4) is used as the last option. Aerial spray projects are executed by contract with private firms. The contractor supplies the herbicide, helicopter and support equipment that meet contract specifications.

No. 34: Fertilizing, Thinning and Pruning

▼ **The department will use fertilization, thinning and pruning on stands which will respond and produce an acceptable rate of return on investment.**

Discussion

The above policy is intended to encourage the department to conduct fertilization, thinning and pruning activities only on sites which will produce an acceptable rate of return.

The benefits must exceed the cost of fertilizing, thinning and pruning. The policy also allows the department to integrate other Forest Resource Plan objectives, such as water quality, provided that they do not lower the rate of return below an acceptable level.

Once a new stand has been established, the department may prune trees with limbs close to the ground to improve wood quality. Pruning is the removal of dead and live branches from the lower portion of the tree bole. By removing these limbs when the stand is between 15 and 35 years old, it is possible to increase the amount of knot-free and high-value wood produced. The department will conduct pruning where it can be demonstrated that it will achieve an acceptable rate of return.

Fertilizers can also be applied to nutrient-deficient soils to increase tree growth. A primary environmental concern in using fertilizers is to maintain water quality on or near the site.

Precommercial thinning is the removal of selected trees early in the timber growing cycle to concentrate growth on the optimum number of healthy trees. Crop trees are chosen on the basis of dominance, vigor, form and spacing. Increased merchantable wood volume on selected trees is an important benefit. The department may also use thinning to control the growth of selected species, improve the health and vigor of certain stands, increase product quality and value, and enhance wildlife habitat by providing for additional forage and protective cover for certain species of animals.

Commercial thinning will be used in stands where it will produce an acceptable rate of return. On some sites, the department intends to postpone precommercial thinning where it is biologically and economically beneficial to wait and conduct commercial thinning only. In general, commercial thinning will occur in stands between 25 and 40 years of age. It may, however, be conducted in stands where a site-specific analysis indicates that the practice is economically, biologically and environmentally sound.